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- SHP2*
1. A method of applying a holographic image to the surface of an article made of hard temper metal comprising:
 - providing a photoresist coated plate,
 - etching a holographic pattern in the photoresist with said pattern etched to a depth o at least about 3 microns in the photoresist,
 - growing a mother shim on said photoresist with said pattern in it from said photoresist,
 - transferring said pattern from the mother shim to multiple sister shims,
 - transferring said pattern from said one of said sister shims to a die having a surface hardness of at least about 200 kg/mm^2 ,
 - providing a metal article to be impressed with said holographic image, said article having a surface hardness of at least about 50 kg/mm^2 , and
 - pressing said die against a surface on said metal article to transfer said holographic image into a surface on said metal article.
 2. A method as set forth in Claim 1 in which said die is applied seriatim against the surface of a succession of said metal articles.
 3. A method as set forth in Claim 1 in which lubricant is sprayed on the surface of at least one of said die and said article to reduce or eliminate buildup of debris on the surface of said die.
 4. A method as set forth in Claim 1 in which said die is a print cylinder made of hard temper aluminum alloy.
 5. A method as set forth in Claim 1 in which said die has an amorphous diamond-like coating on its surface.
 6. A method as set forth in Claim 1 in which said die has a carbon nitride coating on its surface.

7. A method as set forth in Claim 1 in which said article is a hard temper aluminum alloy can body.

8. A method as set forth in Claim 1 in which said article is a strip of hard temper aluminum alloy sheet metal and said method includes forming aluminum end closures from said strip of sheet metal after a series of said holographic image has been transferred into a surface on the strip of sheet metal.

SUB 32 9. A method for producing a die for use in impressing a holographic image many times into strip material or numerous articles comprising:

providing a photoresist coated plate,
 etching a holographic pattern in the photoresist,
 growing a mother shim with said pattern in it from said plate,
 transferring said pattern directly or indirectly from said mother shim

to a metal die, and

coating at least a portion of said die bearing said holographic image with a diamond-like coating.

10. A method as set forth in Claim 9 in which said coating is an amorphous diamond-like coating.

11. A method as set forth in Claim 9 in which said holographic pattern is etched in said photoresist coating to a depth of at least about 3 microns.

12. A method as set forth in Claim 9 in which said coating has a thickness less than about 5000 angstroms and a hardness of at least about 80 Gpa.

13. A method as set forth in Claim 9 in which said die is a cylinder made of hard metal and said holographic image is formed in the surface of said metal cylinder.

14. A method as set forth in Claim 9 in which said pattern in said metal die comprises pits in the surface of the die.

15. A method as set forth in Claim 9 in which said pattern in said mother shim is transferred to at least one sister shim and from said sister shim to said metal die.

SUB 33 16. A method of applying a holographic image to the surface of hard temper aluminum can bodies comprising:

providing at least one cylindrical print cylinder having a holographic image in its surface around a portion of the circumference of the print cylinder and a smooth surface around the remainder of the circumference of the print cylinder,

providing a hard temper aluminum can body having a longitudinal axis parallel with the longitudinal axis of said at least print cylinder,

moving at least one of said at least one print cylinder and said can body toward the other to press said smooth surface on the print cylinder against said can body under substantial interfacial pressure, and

5 rotating at least one of said can body and said at least one print cylinder on its longitudinal axis while maintaining said substantial interfacial pressure to transfer said image from said print cylinder to the surface of said can body.

17. A method as set forth in Claim 16 which includes pressing two of said print cylinders against said can body on substantially opposite sides of the can body.

10 18. A method as set forth in Claim 17 in which said two print cylinders each have a portion of a holographic image that is transferred to said can body and each cylinder rotates against a separate portion of the can body.

15 19. A method as set forth in Claim 16 in which said print cylinder is mounted as a cantilever and a bearing support is provided for the end of said cantilever to reduce deflection of the cantilever.

20 20. A method as set forth in Claim 16 in which said print cylinder has a diameter larger than said can body, and the portion of the circumference of said print cylinder bearing said holographic image is approximately equal to the circumference of said can body.

20 21. A method as set forth in Claim 16 in which said holographic image in said print cylinder comprises pits/grooves in the surface of the cylinder.

25 22. A method of applying a holographic image to the surface of sheet metal comprising:

supporting said sheet metal against a flat plate member, and
passing said sheet metal on said plate member through a bite between a turning print cylinder having a holographic image in its surface and a turning backup roll with the sheet metal product moving against said holographic image on the print cylinder to impress the image into the surface of the sheet metal.

23. A method as set forth in Claim 22 in which said holographic image on said print cylinder comprises pits/grooves in the surface of the print cylinder.

30 24. A method as set forth in Claim 22 in which said sheet metal comprises foil.

25. A method as set forth in Claim 24 in which said foil is aluminum foil.

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